

FIFTH QUARTERLY PROGRESS REPORT

FOR THE PERIOD

July 1, 1965 through Sept. 30, 1965

INFRARED RADIATION MEASUREMENTS OF COMBUSTION GASES

University of California at Berkeley

October 15, 1965

Prepared for
George C. Marshall Space Flight Center, NASA,
Huntsville, Alabama

Under Contract No. NAS 8-11468

Reproduction in whole or in part is permitted
for any purpose of the United States Government

FACULTY INVESTIGATORS:

W. H. GIEDT, Professor of Mechanical Engineering
C. L. TIEN, Associate Professor of Mechanical Engineering

FACILITY FORM 808

N66-83050
(ACCESSION NUMBER)

2
(PAGES)

CR 74 188
(NASA OR TMX OR AD NUMBER)

(THRU)
none
(CODE)

(CATEGORY)

Infrared Spectral Absorptivities of Carbon Monoxide

The objective of this investigation is to obtain the spectral characteristics of a number of common combustion products under a variety of accurately known thermodynamic and optical conditions. During the present report period measurements of the spectral absorptivities of carbon monoxide have been completed. These are included in the attached report entitled:

"Infrared Radiation of Carbon Monoxide at High Temperatures," Report No. TS-65-5, Contract NAS 8-11468, Sept. 30, 1965.

Spectral absorption measurements for the 4.67 micron fundamental band are presented for path lengths of 1, 5, 10 and 20 cm at temperatures of 300, 600, 900, 1200 and 1500 °K over the pressure range of 1/4 to 3 atm. For the first overtone band absorption was found to be significant only for a path length of 20 cm at pressures of 1, 2 and 3 atm for the same temperatures. The integrated absorption for both the fundamental and first overtone bands is given in tabular form as a function of temperature, pressure and path length.

The spectral absorption data in the fundamental band for path lengths of 10 and 20 cm were successfully correlated by the Elsasser strong line approximation for all temperatures. A method of correlating the integrated band absorption is indicated and the results for 900 °K are shown.

Project Schedule

In order to make spectral absorptivity measurements at temperatures above 1500 °K a new type of window holder has been proposed. This incorporates sapphire windows held in place and separated by the desired distance with ceramic tubes. This is being designed and will be fabricated during the coming quarter. Initial testing of this ceramic tube window holder will be with carbon monoxide. Effort will then be directed to carbon dioxide and water vapor.